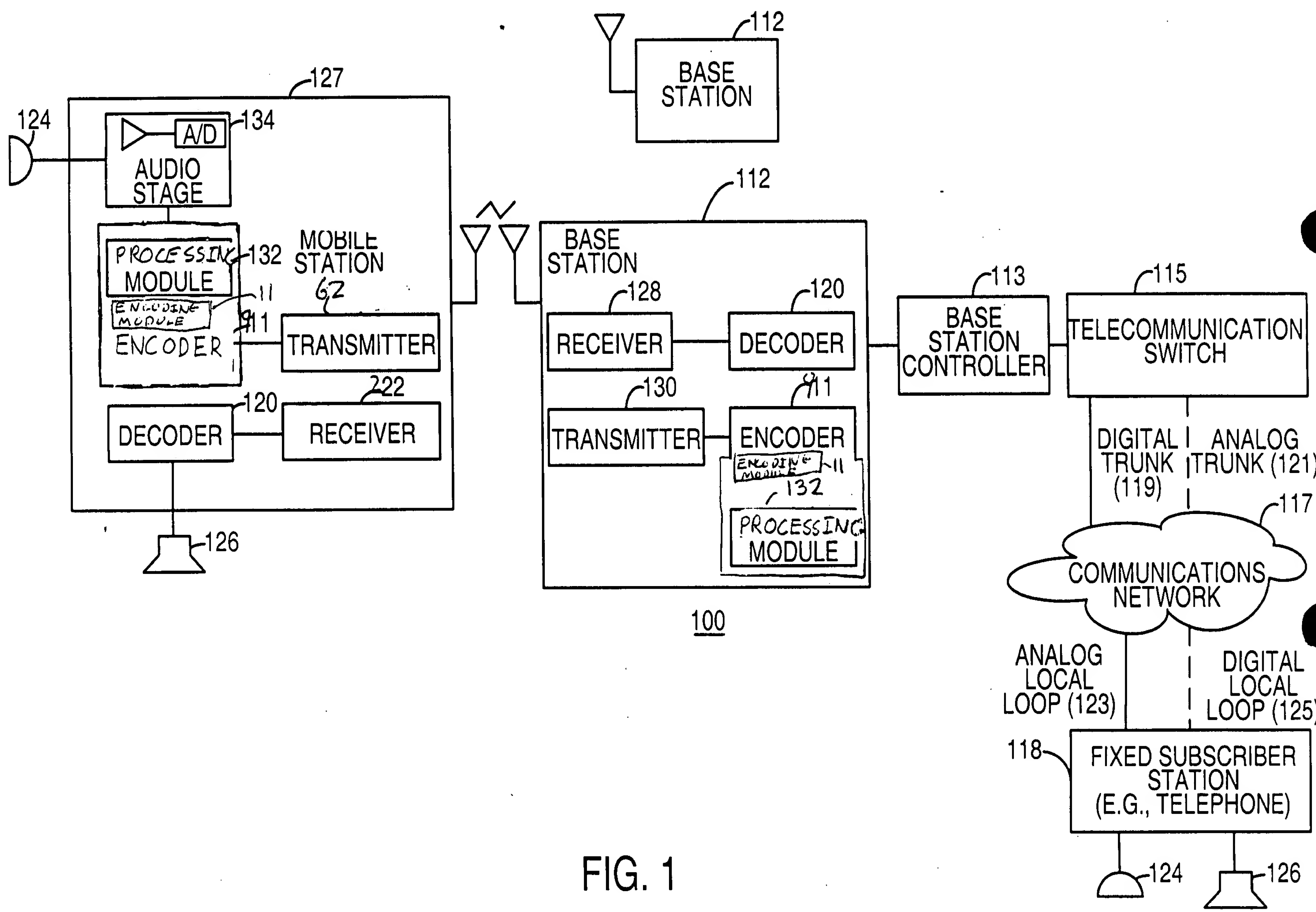
127
124
134
A/D
AUDIO STAGE
PROCESSING MODULE
132
11
ENCODING MODULE
911
ENCODER
MOBILE STATION
62
TRANSMITTER
120
222
DECODER
RECEIVER
126
112
BASE STATION
112
BASE STATION
128
RECEIVER
120
DECODER
130
TRANSMITTER
911
ENCODER
ENCODING MODULE
11
132
PROCESSING MODULE
100
113
BASE STATION CONTROLLER
115
TELECOMMUNICATION SWITCH
DIGITAL TRUNK (119)
ANALOG TRUNK (121)
117
COMMUNICATIONS NETWORK
ANALOG LOCAL LOOP (123)
DIGITAL LOCAL LOOP (125)
118
FIXED SUBSCRIBER STATION (E.G., TELEPHONE)
124
126

FIG. 1

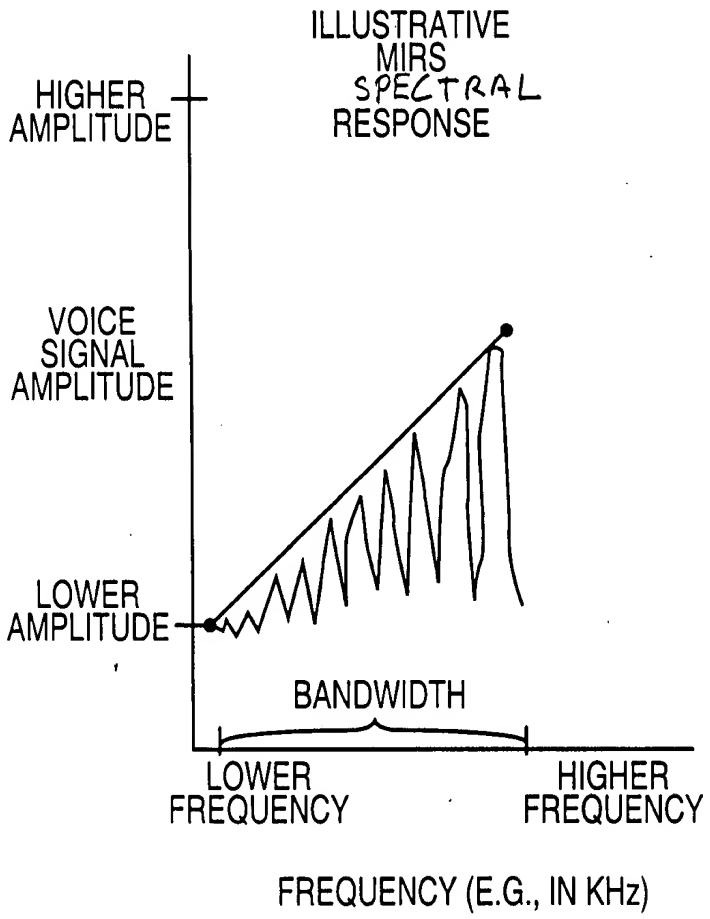

FIG. 2A

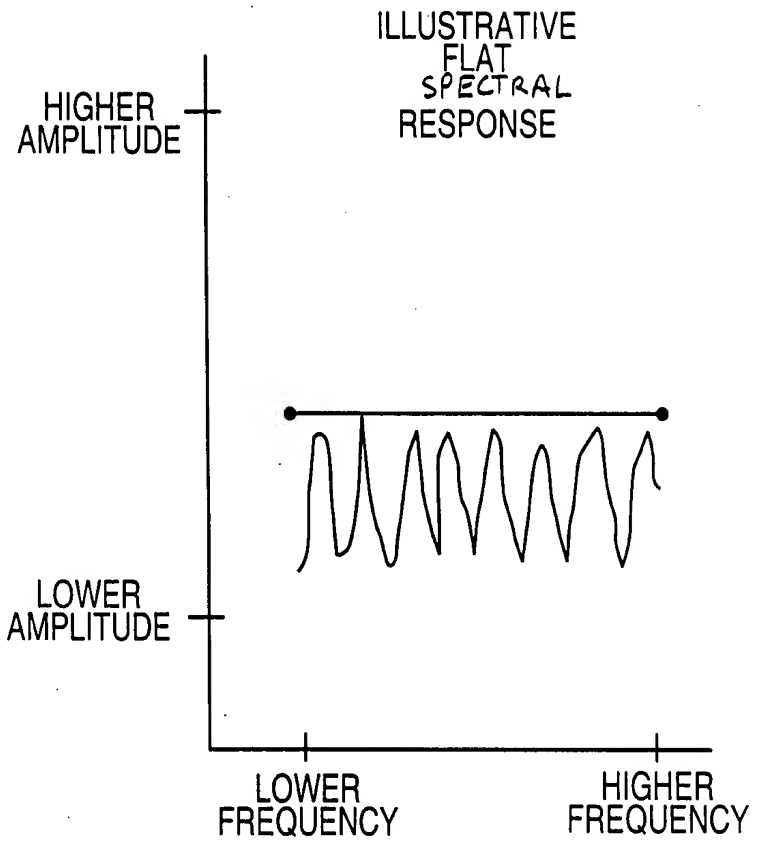

FIG. 2B

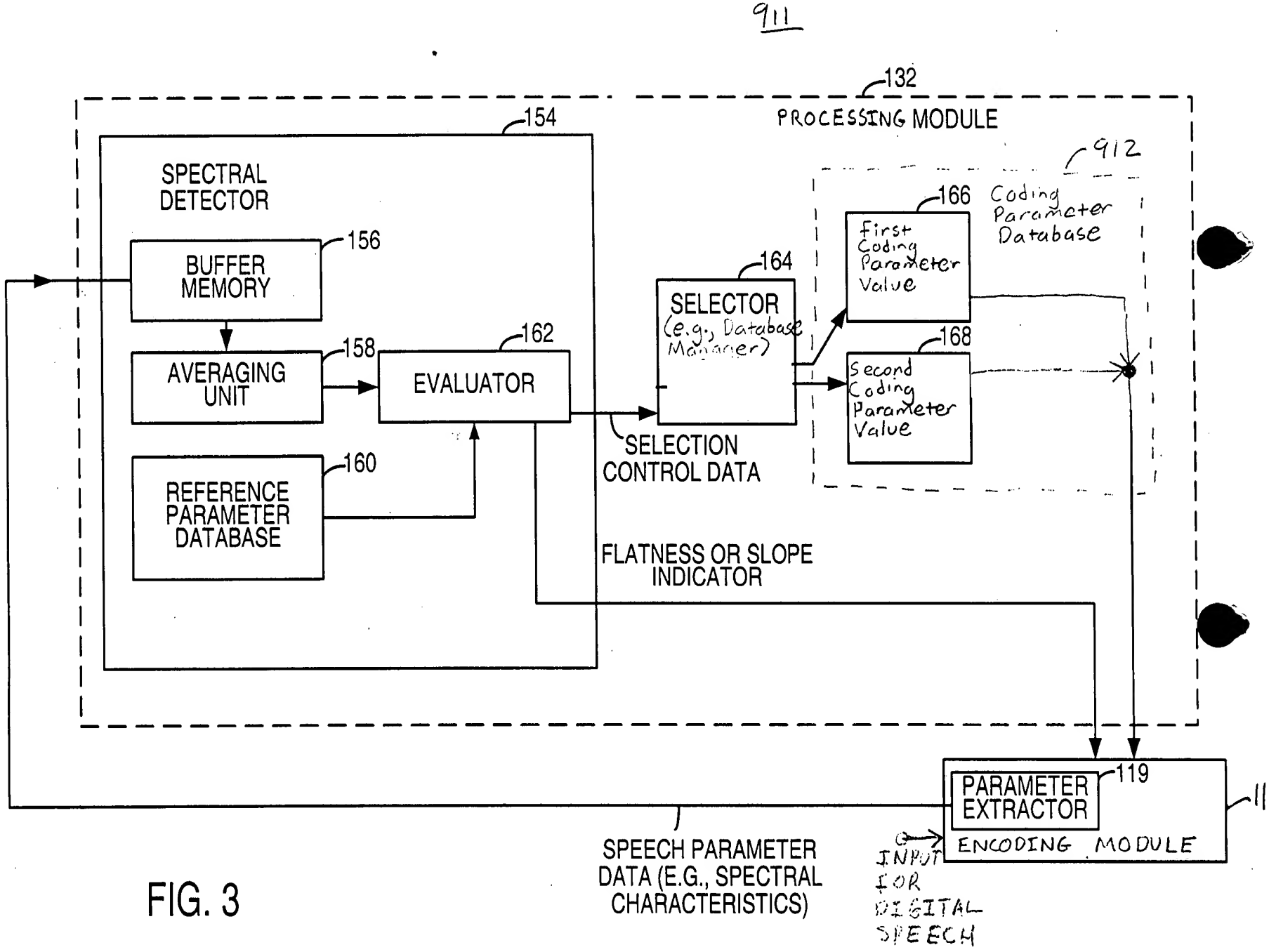
911
132
PROCESSING MODULE
154
SPECTRAL DETECTOR
BUFFER MEMORY
156
AVERAGING UNIT
158
EVALUATOR
162
REFERENCE PARAMETER DATABASE
160
SELECTOR (e.g., Database Manager)
164
912
166
Coding Parameter Database
First Coding Parameter Value
168
Second Coding Parameter Value
SELECTION CONTROL DATA
FLATNESS OR SLOPE INDICATOR
PARAMETER EXTRACTOR
119
ENCODING MODULE
11
SPEECH PARAMETER DATA (E.G., SPECTRAL CHARACTERISTICS)
INPUT FOR DIGITAL SPEECH

FIG. 3

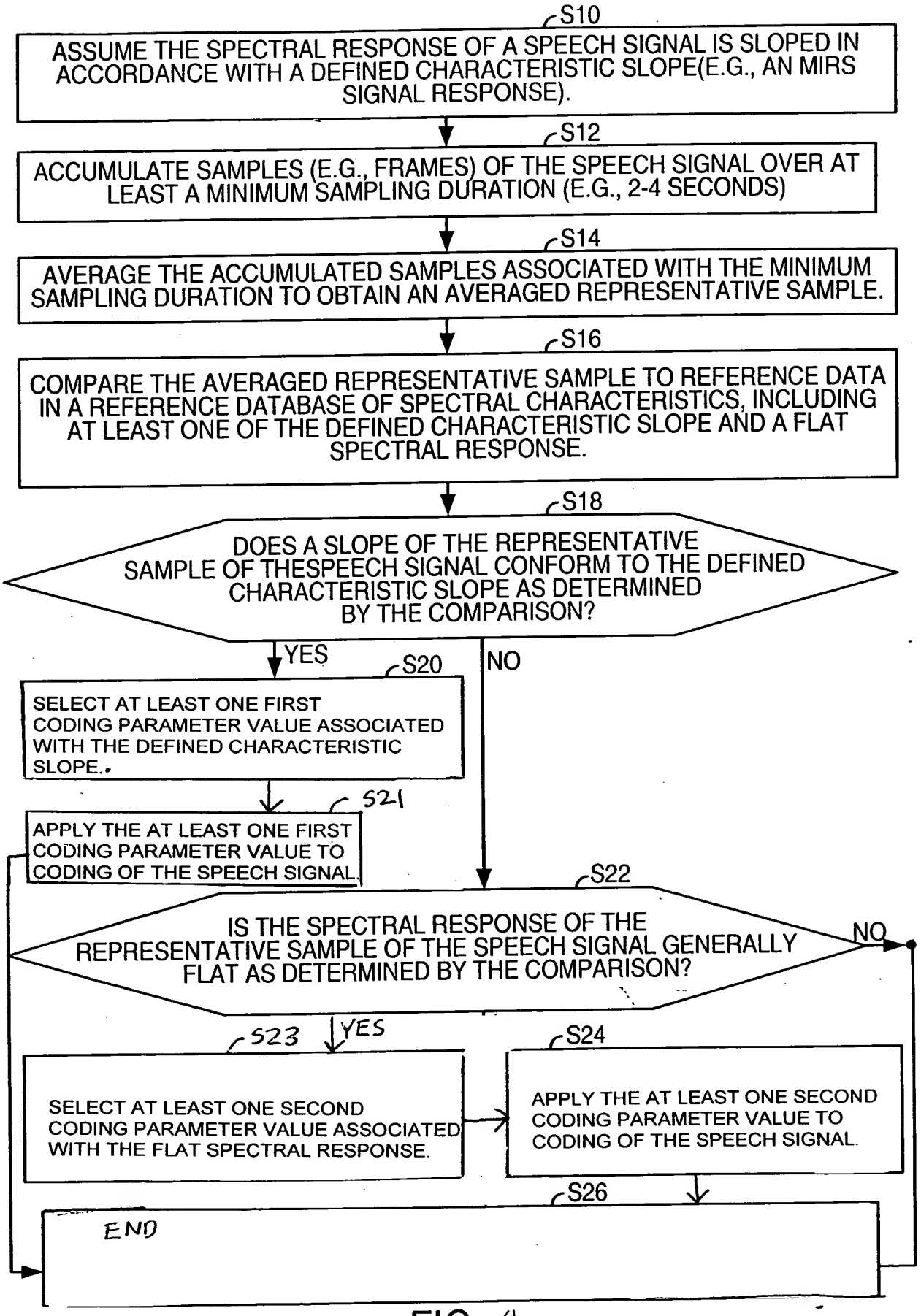
S10
ASSUME THE SPECTRAL RESPONSE OF A SPEECH SIGNAL IS SLOPED IN ACCORDANCE WITH A DEFINED CHARACTERISTIC SLOPE(E.G., AN MIRS SIGNAL RESPONSE).
S12
ACCUMULATE SAMPLES (E.G., FRAMES) OF THE SPEECH SIGNAL OVER AT LEAST A MINIMUM SAMPLING DURATION (E.G., 2-4 SECONDS)
S14
AVERAGE THE ACCUMULATED SAMPLES ASSOCIATED WITH THE MINIMUM SAMPLING DURATION TO OBTAIN AN AVERAGED REPRESENTATIVE SAMPLE.
S16
COMPARE THE AVERAGED REPRESENTATIVE SAMPLE TO REFERENCE DATA IN A REFERENCE DATABASE OF SPECTRAL CHARACTERISTICS, INCLUDING AT LEAST ONE OF THE DEFINED CHARACTERISTIC SLOPE AND A FLAT SPECTRAL RESPONSE.
S18
DOES A SLOPE OF THE REPRESENTATIVE SAMPLE OF THESPEECH SIGNAL CONFORM TO THE DEFINED CHARACTERISTIC SLOPE AS DETERMINED BY THE COMPARISON?
YES
NO
S20
SELECT AT LEAST ONE FIRST CODING PARAMETER VALUE ASSOCIATED WITH THE DEFINED CHARACTERISTIC SLOPE.
S21
APPLY THE AT LEAST ONE FIRST CODING PARAMETER VALUE TO CODING OF THE SPEECH SIGNAL.
S22
IS THE SPECTRAL RESPONSE OF THE REPRESENTATIVE SAMPLE OF THE SPEECH SIGNAL GENERALLY FLAT AS DETERMINED BY THE COMPARISON?
NO
S23
YES
SELECT AT LEAST ONE SECOND CODING PARAMETER VALUE ASSOCIATED WITH THE FLAT SPECTRAL RESPONSE.
S24
APPLY THE AT LEAST ONE SECOND CODING PARAMETER VALUE TO CODING OF THE SPEECH SIGNAL.
S26
END

FIG. 4

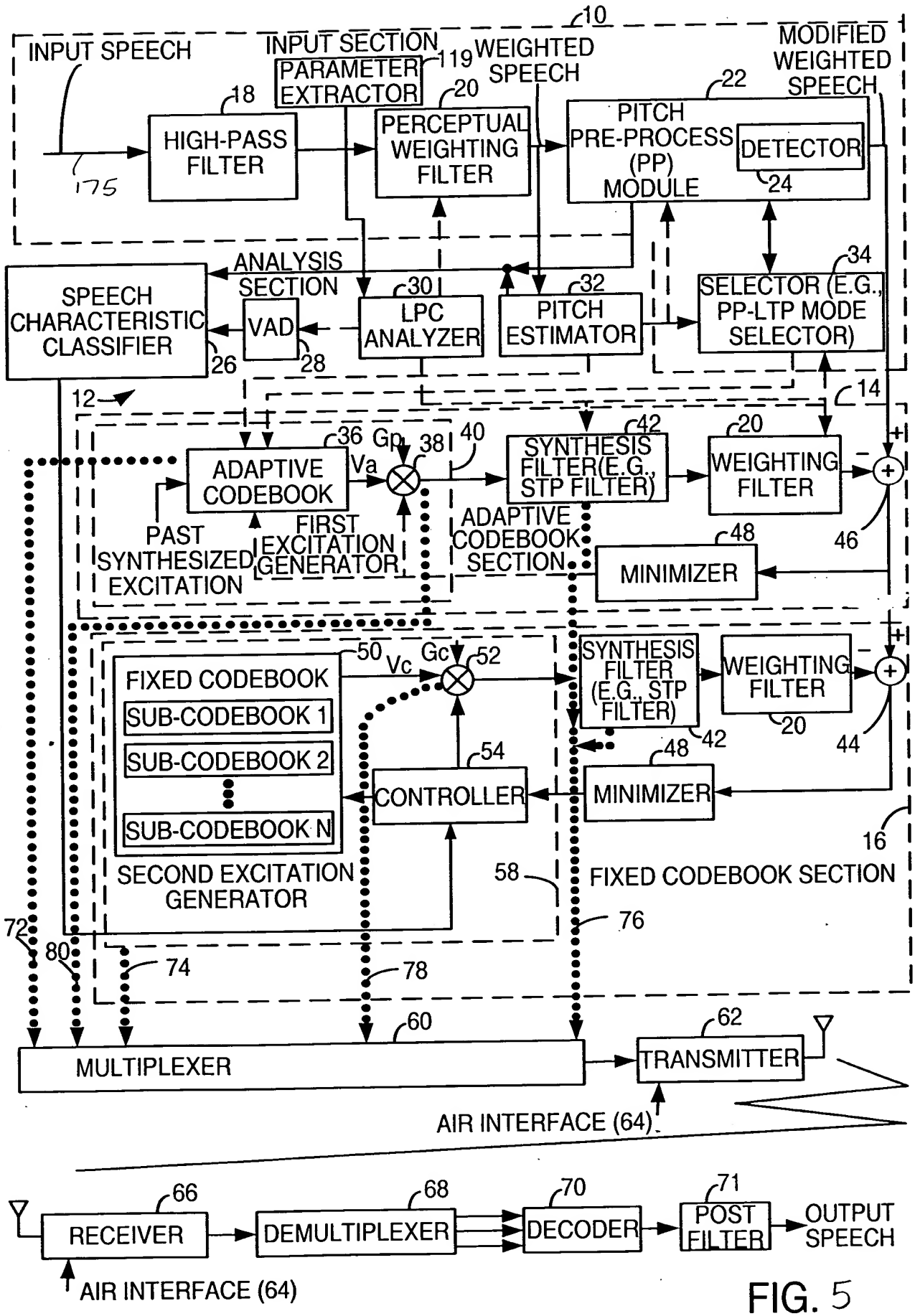
10
INPUT SPEECH
INPUT SECTION
PARAMETER EXTRACTOR
119
WEIGHTED SPEECH
MODIFIED WEIGHTED SPEECH
18
HIGH-PASS FILTER
20
PERCEPTUAL WEIGHTING FILTER
22
PITCH PRE-PROCESS (PP) MODULE
DETECTOR
24
175
ANALYSIS SECTION
SPEECH CHARACTERISTIC CLASSIFIER
26
VAD
28
30
LPC ANALYZER
32
PITCH ESTIMATOR
34
SELECTOR (E.G., PP-LTP MODE SELECTOR)
12
14
911
36
Gp
38
40
ADAPTIVE CODEBOOK
Va
42
SYNTHESIS FILTER(E.G., STP FILTER)
20
WEIGHTING FILTER
46
PAST SYNTHESIZED EXCITATION
FIRST EXCITATION GENERATOR
ADAPTIVE CODEBOOK SECTION
48
MINIMIZER
50
Vc
Gc
52
FIXED CODEBOOK
SUB-CODEBOOK 1
SUB-CODEBOOK 2
SUB-CODEBOOK N
SYNTHESIS FILTER (E.G., STP FILTER)
WEIGHTING FILTER
20
42
44
54
CONTROLLER
48
MINIMIZER
16
SECOND EXCITATION GENERATOR
58
FIXED CODEBOOK SECTION
72
80
74
78
76
60
62
MULTIPLEXER
TRANSMITTER
AIR INTERFACE (64)
66
68
70
71
RECEIVER
DEMULTIPLEXER
DECODER
POST FILTER
OUTPUT SPEECH
AIR INTERFACE (64)

FIG. 5

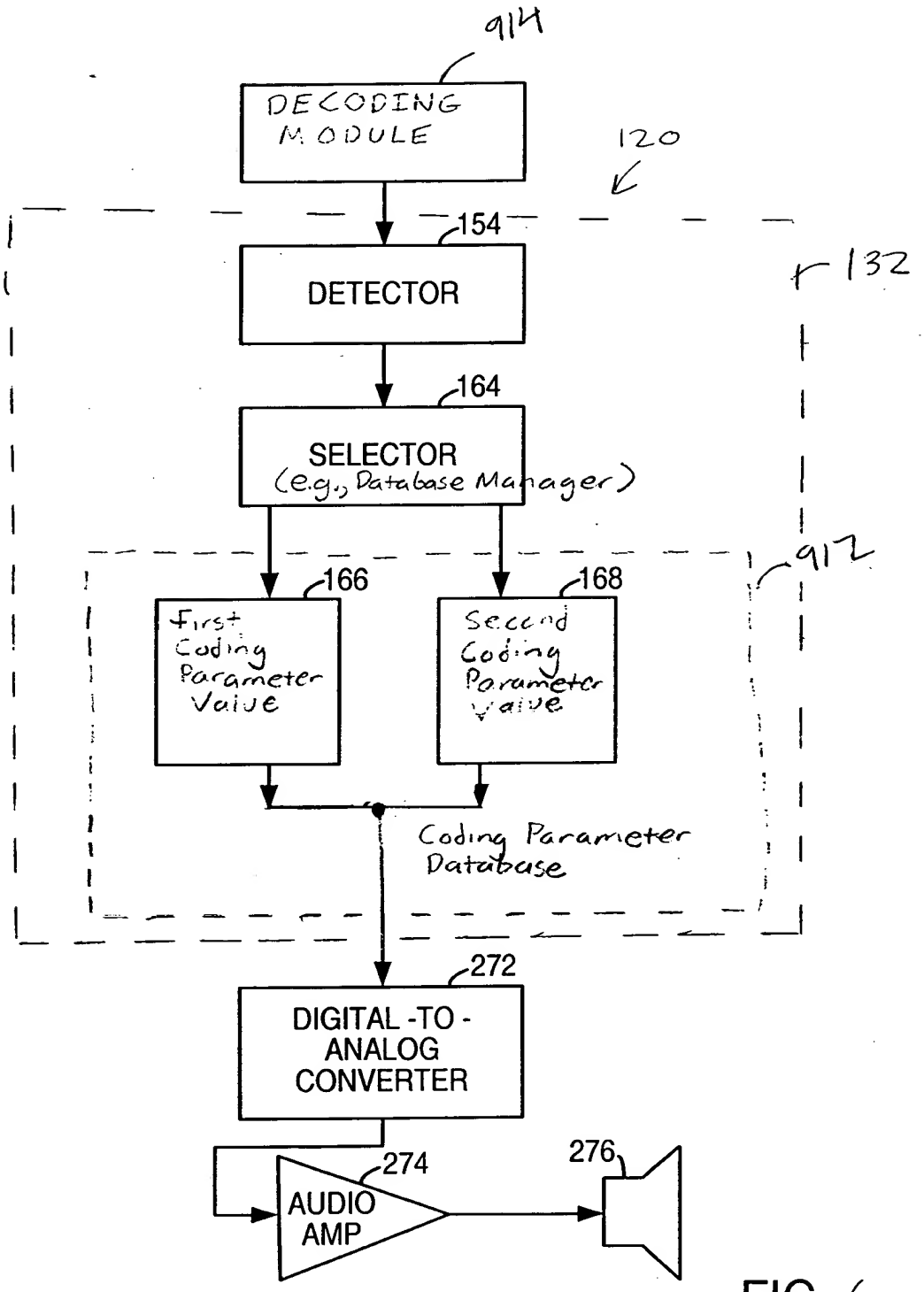
914
DECODING MODULE
120
154
DETECTOR
132
164
SELECTOR (e.g., Database Manager)
912
166
First Coding Parameter Value
168
Second Coding Parameter Value
Coding Parameter Database
272
DIGITAL-TO-ANALOG CONVERTER
274
AUDIO AMP
276

FIG. 6

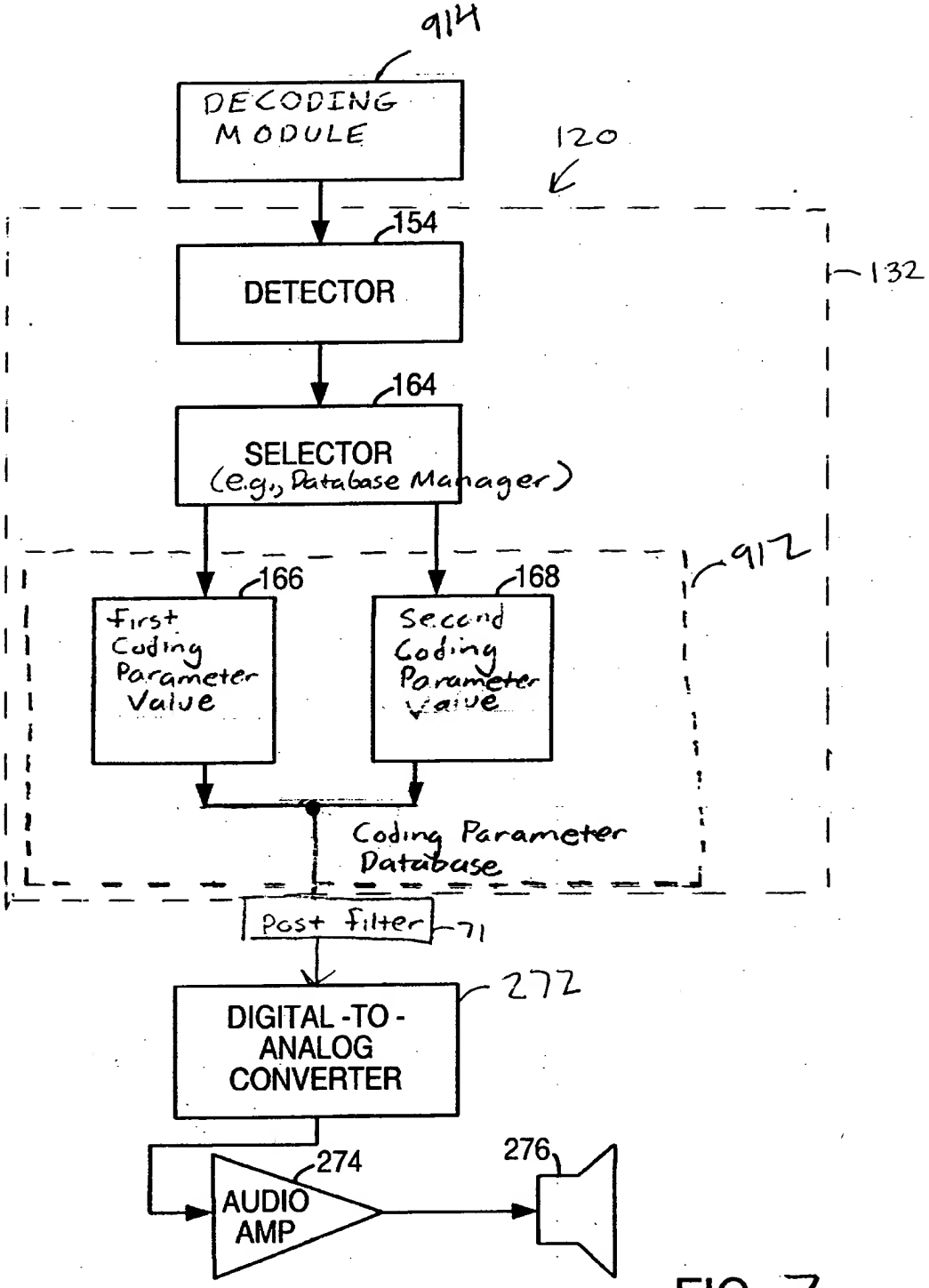
914
DECODING MODULE
120
154
DETECTOR
132
164
SELECTOR (e.g., Database Manager)
912
166
First Coding Parameter Value
168
Second Coding Parameter Value
Coding Parameter Database
Post Filter
71
272
DIGITAL-TO-ANALOG CONVERTER
274
AUDIO AMP
276

FIG. 7